

## What's happening in your building?

Energy efficient buildings provide a comfortable environment for the building users. If a building does not provide a comfortable environment there is probably a problem which is wasting energy as well. Building users are normally very aware of any sources of discomfort and these are often crucial in diagnosing the energy use patterns of the building. These identified comfort issues in combination with analysis of how the building is supposed to operate, detailed measurements of operation and energy use patterns are the key to finding energy savings. Below is a common list of building symptoms, their likely causes and what impact they may be having on energy use.

**Symptom:** My building gets too hot

**Diagnosis:** The obvious answer to this is that the thermostat control is set correctly. Most buildings in New Zealand start heating if the temperature drops below 20°C or 21°C. If the heating set point is higher than this then the building will be hotter (and potentially 'too hot'). Alternatively, the thermostats may be broken and not correctly controlling the heating properly. In either situation, the heating system (whatever it may be) is probably being used too much and wasting energy.

**Symptom:** My part of the building gets too hot/cold in the afternoon/morning

**Diagnosis:** This tends to suggest that the building is being adversely affected by the outside climatic conditions. The amount of solar gain (heat) that comes through the windows (and to a lesser extent other building surfaces) is dependent on how sunny it is and if the window is looking towards the sun. In buildings with a large floor plate it is common to have a significant difference in temperature between rooms on the north or south side of the building. If the same amount of heating (or cooling) is supplied to the entire floor, it will not be able to satisfactorily adjust for this difference. The best way to control this is to have heating (and cooling systems) which are zoned to take account of solar gain. This should be done in combination with design measures to ensure there is a similar temperature across the entire floor, such as shading devices.

**Symptom:** It's not bright enough

**Diagnosis:** Often the use of buildings change but the lighting layout remains the same. This may lead to inappropriately placed light fixtures, so the light is not provided where it should be. Also, lighting fixtures age. The lamps give out less light over time and, if a diffuser is used, these can become dirty and often yellow over time, dramatically reducing the light output. If the fixtures are located in appropriate positions, the lamps replaced and the diffusers cleaned, replaced or removed then the light levels can be significantly increased without needing to install any more lights (and use more energy).

**Symptom:** It's too bright

**Diagnosis:** Only a few people complain about having too much light and often it is too much natural light causing glare that it the main concern. Simply installing blinds can generally solve glare. On the other hand, if there is a lot of light, the use of daylight sensors to switch off artificial lighting should be considered. If there is too much light from electric lighting then removing excess lamps is the most simple solution. 500 lux is accepted norm for required lighting levels in offices and many other situations. However it is not uncommon to find illuminance in excess of 1000 lux – a big waste of energy.

**Symptom:** It's too draughty

**Diagnosis:** In buildings with mechanical ventilation (ie: fans to supply fresh air to the building, which are generally have ducts running to outlets in the ceiling) the system should be designed so that the air flow out of the grilles in the ceiling is evenly distributed through the room, rather than 'dumping' pockets of supply air. Very detailed design of the mechanical plant in the building should ensure this happens. However, sometimes the air filters don't get changed/cleaned often enough, the ductwork might be installed with too many bends in it or the whole system design may be flawed. All this leads to a ventilation system which does not provide good service to the building users, as well as making the fans work harder and waste energy.

**Symptom:** All of a sudden my energy bill is twice as high as last month

**Diagnosis:** In general energy prices are going up and the energy consumption of many organisations is growing. However, when there is such a major unexpected increase in the energy bill there is nearly always a fault. First check that there isn't a billing error – energy supply companies don't always get the numbers right. How much energy do you purchase on the spot market (if there is a power shortage spot prices can get very high). If all the billing details are correct then it must be your energy use that has gone up. For such a dramatic change in use the control of the building must have changed. Perhaps the maintenance staff accidentally left some of the plant running all the time, when it is normally scheduled to switch off over night. Maybe the thermostats have broken. Maybe you have a hot water leak. It could be any number of things, and until they are found your energy bill will continue to be this high.